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NOTES ON GEOGRAPHIC DISTRIBUTION

Mammalia, Didelphimorphia, Didelphidae, *Monodelphis kunsi* Pine, 1975: Distribution extension and first record for eastern Amazonia

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ABSTRACT: We review the distributional records of *Monodelphis kunsi*, which occurs from eastern Bolivia, Paraguay, and northern Argentina into central Brazil. We report specimens of *M. kunsi* collected in the Carajás National Forest in eastern Pará, Brazil (06°03'00" S, 50°15'00" W), extending the known species range 430 km northward, into the eastern edge of Amazonia. This is the first record for the state of Pará, and the first certain record for the Amazon Region. Two adult males and one subadult female were deposited in the Museu Nacional, Rio de Janeiro.

Monodelphis kunsi Pine, 1975, is a very small, terrestrial marsupial without a sagittal crest and with short brown pelage; usually with whitish areas ventrally (Anderson 1982). It is a problematical species because a good series of specimens (including males and females of different age classes) has never been collected from a single locality, yet specimens have been recorded from widely differing habitats, ranging from xeric savannahs to moist evergreen forests, and from widely separated localities, ranging from northern Argentina, Paraguay, and eastern Bolivia to central Brazil (Anderson 1982; Mares *et al.* 1989; Emmons 1998; Vargas *et al.* 2003). The original type locality is "La Granja, W bank of Rio Itonamas, 4 k N Magdalena, Provincia Itenez, Departamento Beni, Bolivia, below 200 m" (13°18' S, 64°09' W) (Pine 1975). Since the time of the original description, a broad range of localities has been registered for this species, through southern and eastern Bolivia (Anderson 1982; Emmons 1998), central Brazil (Mares *et al.* 1989), northern Argentina (Jayat and Miotti 2005), and eastern Paraguay (Sancha *et al.* 2007). It is now clear that this small *Monodelphis* either has a very large and complex range, or in reality is a complex of separate species (Solari 2010). Unfortunately, because specimens are still rare in collections, revisionary efforts will be difficult.

In this paper, we expand the known distribution of *M. kunsi* about 430 km north of its range as presently understood. The new locality is in the National Forest of the Serra dos Carajás (06°03'00" S, 50°15'00□ W, Figure 1), in Pará state, Brazil. This new distributional locality is characterized by a mosaic of Equatorial Amazonian Rain Forest and other vegetation associated with the rocky outcroppings, called Metalliferous Savanna (Silva *et al.* 1996), or "canga". The climate is hot and humid; daily temperatures range between 24.3°C and 28.3°C and the mean annual precipitation is 2,116 mm (Silva *et al.* 1996). This is the first record for the eastern edge of Amazonian Brazil and the northernmost record for the species. We also reduce the known range and cast doubt on the western borders of *M. kunsi* by reporting that two specimens originally reported from western Bolivia (Vargas *et al.* 2003) have now been identified as *M. peruvianus* (Sergio Solari, personal communication; Solari 2007). Also, a single record cited for Amazonian Brazil (Pine and Handley 2008) from "Alto Acre" (in southeastern Acre), is now considered a debatable identification by R. Pine (personal communication), who examined the specimen many years ago. The specimen is a juvenile, preserved in alcohol, and is identified simply as *Monodelphis* sp. in the Zoological Museum Berlin (personal communication, Frieden Mayer and Saskia Jancke). More information is needed concerning this specimen.

During survey field work with pitfalls and mesh traps we captured two adult males and an immature female of *M. kunsi* (Figure 2). The first specimen, FMH-127, was captured in February 2009, the second in July 2009 (FMH-356) and the third in February 2010 (FMH-420). All three individuals were captured on the ground in pitfall traps in Equatorial Rain Forest vegetation. The specimens were prepared as standard skins; full skeletons; tissues (liver and muscle) were also collected. These voucher specimens have been deposited in the Museu Nacional, Rio de Janeiro; specimens MN73872, MN74002, MN74003, respectively. The collecting permit number for these specimens was ICMBio 02018.001735/2006-91.

The small size and pelage coloration clearly separate these specimens from any other *Monodelphis* known from Amazonia, and align them with typical *M. kunsi*. Our specimens have short, uniformly brown pelage dorsally (more tawny on head and behind ears) and a pale cream midventral stripe. Sympatric *Monodelphis* are all clearly larger species (an unnamed species often referred to as *Monodelphis* [species D] of Pine and Handley (2008) and *M. glirina*). In our voucher series of *M. kunsi*, the dorsal pelage is short, uniformly chocolate-brown, with grizzling of lighter brown; slightly golden on head and behind ears; guard hairs sparse and black. The venter has a self-white ventral stripe (varying in

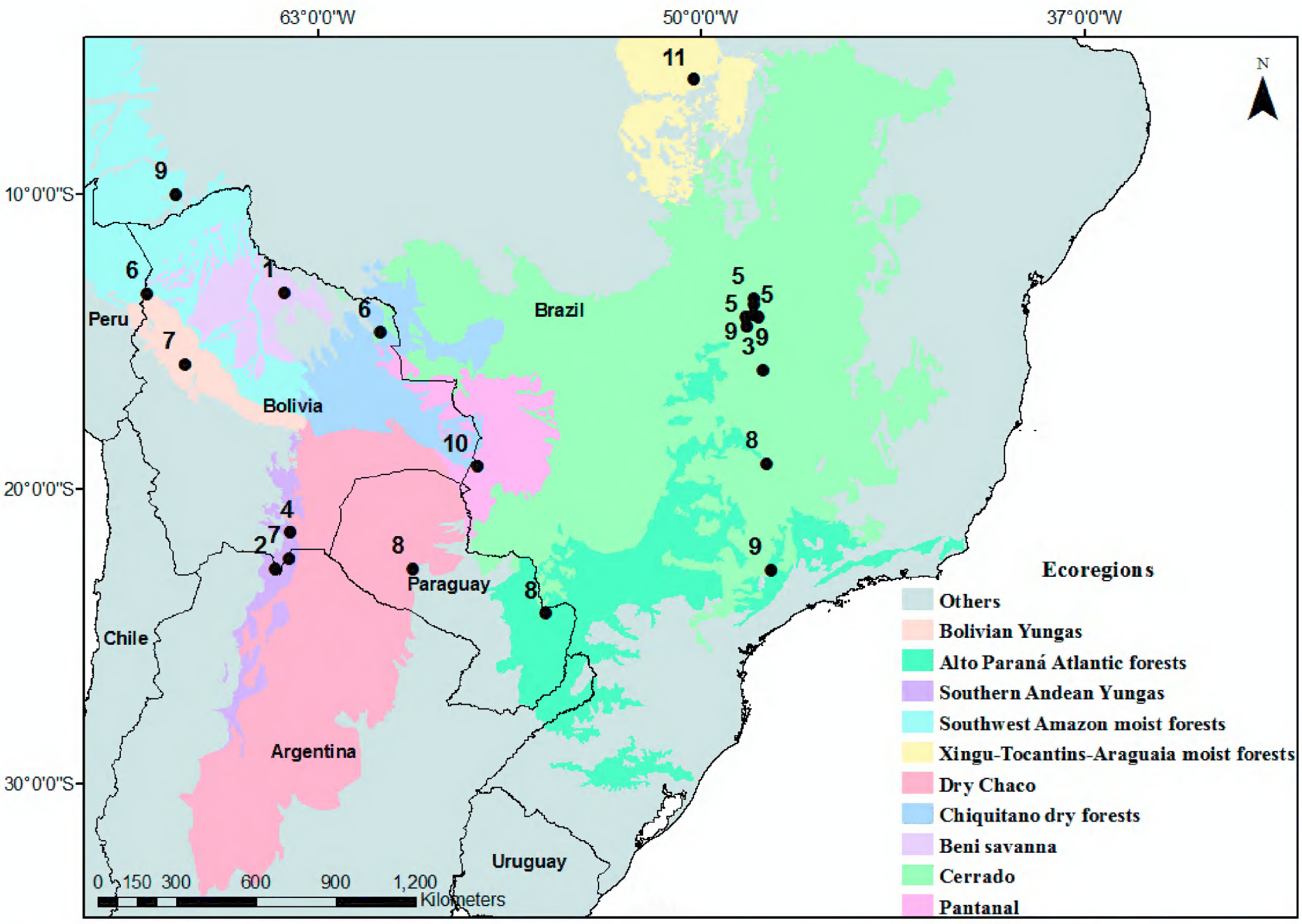
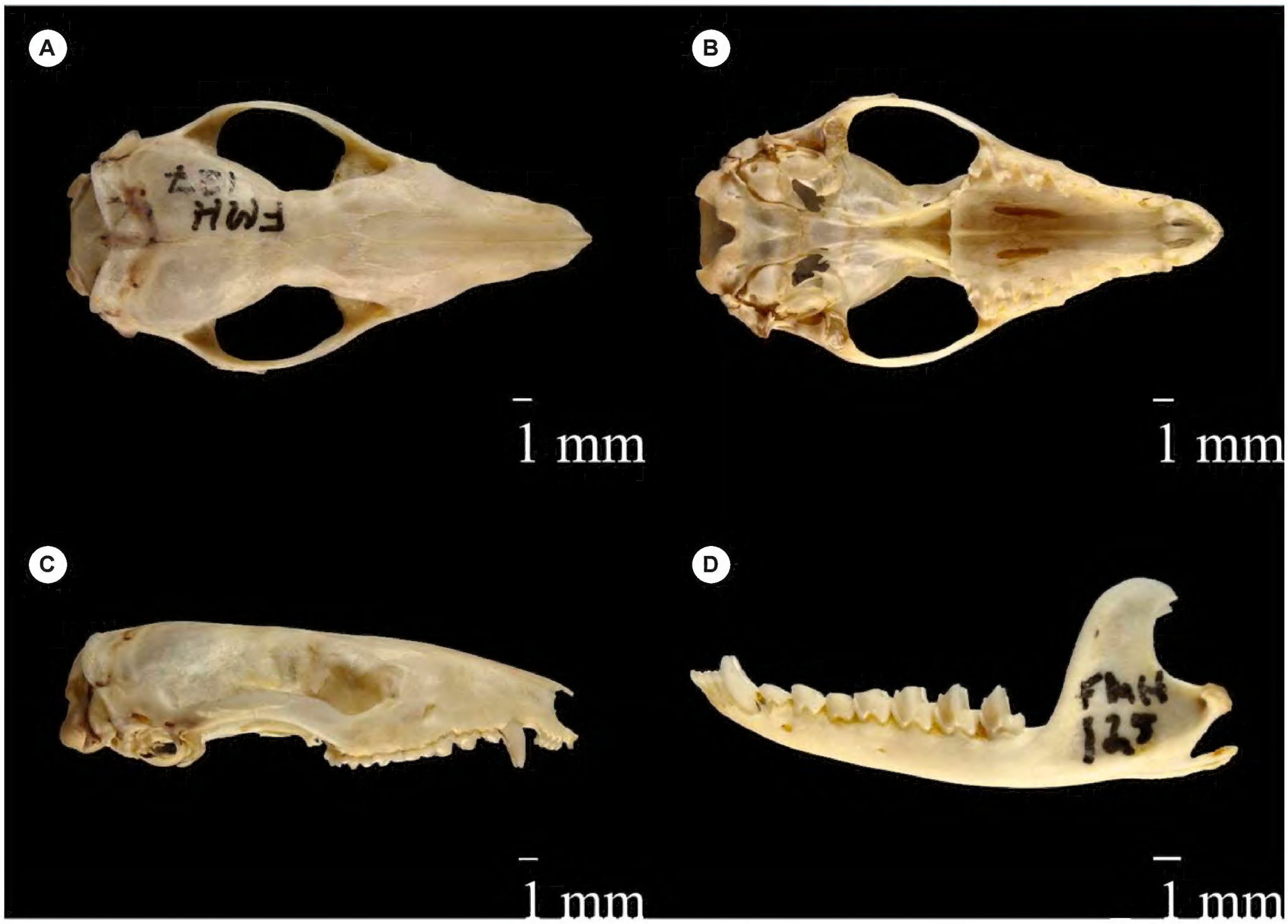


FIGURE 1. Known localities for *Monodelphis kunsi* and their respective ecoregions according to Olson *et al.* (2001). The numbers represent the chronological order of the records (i.e. 1- Pine 1975, the type locality; 2- Anderson 1982; 3- Mares *et al.* 1989; 4- Salazar *et al.* 1994; 5- Carvalho *et al.* 2002; 6- Vargas *et al.* 2003; 7- Jayat and Miotti 2005; 8- Sancha *et al.* 2007; 9- Pine and Handley 2008; 10- Godoi *et al.* 2010; 11- This work). A list of all records appears in Appendix 1.

FIGURE 2. Dorsal (A) and ventral (B) views of a stuffed skin of *M. kunsi* (Specimen: MN 73872 [FMH-127], Sex: male, Age class: P 3/3 M 4/4) captured in the National Forest of the Serra dos Carajás, PA.

width, but clearly present in all three specimens); throat-gland present in males. Skull with postorbital processes and sagittal crest absent; paraoccipital processes well-developed, but not persisting to dorsal midline; both lacrimal foramina present and clearly outside orbit; upper first pair of incisors smaller than posterior incisors. External measurements and weight of the two adult male voucher specimens (MN73872, MN74002) are given in appendix 2. Solari (2010) and Carvalho *et al.* (2011) have presented evidence of a genetic divergence between specimens from southern Bolivia/ northern Argentina/ eastern Paraguay, and specimens from the Cerrado of central Brazil. Although we are referring these specimens to *M. kunsi*, based on the morphological characters cited above, our specimens are larger than those specimens reported from the Andean dry forests, Chaco and Cerrado habitats, and we believe that further studies and the survey of more specimens may reveal that *M. kunsi* is a species complex, and that our *Monodelphis* specimens from the Carajás National Forest represent an undescribed species related to this taxon.



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Appendix 1. List of all localities mentioned in this report (based in Sancha *et al.* 2007).

REFERENCE	COUNTRY	STATE OREPARTMENT	LOCALITY	LATITUDE	LONGITUDE	ELEV. (MASL)
Jayat and Miotti (2005)	Argentina	Salta	Gral. Jose de San Martín, Finca Falcón	22°18' S	63°58' W	700
Pine (1975)	Bolivia	Beni	Itenez, La Granja, west margin R. Itinamas	13°18' S	64°09' W	200
Vargas *et al.* (2003)	Bolivia	La Paz	Iturralde, PNAAMI Alto Madidi	13°20' S	68°47' W	250
Vargas *et al.* (2003)	Bolivia	Santa Cruz	Parque Nacional Noel Kempff Mercado	14°39' S	60°53' W	200
Salazar *et al.* (1994)	Bolivia	Tarija	Tapecua	21°26' S	63°55' W	1500
Anderson (1982)	Bolivia	Tarija	Rio Lipeo	22°41' S	64°26' W	640
Mares *et al.* (1989)	Brazil	Distrito Federal	Brasilia, 20 Km S	15°58' S	47°55' W	1100
Carvalho *et al.* (2002)	Brazil	Goiás	Serra do Mesa, 20 km NW Colinas do Sul	14°09' S	48°04' W	N/A
Carvalho *et al.* (2002)	Brazil	Goiás	Serra do Mesa, 49 Km SW Minacu	13°31' S	48°13' W	N/A
Carvalho *et al.* (2002)	Brazil	Goiás	Serra do Mesa, 55 Km N Niquelandia	14°28' S	48°27' W	N/A
Sancha *et al.* (2007)	Brazil	Minas Gerais	Reserva do Jacob, Nova Ponte	19°06' S	47°46' W	750
Sancha *et al.* (2007)	Paraguay	Canindeyú	Reserva de Biosfera del Bosque Mbaracayú	24°11' S	55°16' W	200
Sancha *et al.* (2007)	Paraguay	Presidente Hayes	Cruce de los Pioneros	22°40' S	59°46' W	370
Pine and Handley (2008)	Brazil	Acre	Alto Acre	09°58' S	67°48' W	N/A
Godoi *et al.* (2010)	Brazil	Mato Grosso do Sul	Maciço do Urucum	19°12.332' S	57°34.573' W	700-980
This report	Brazil	Pará	Serra dos Carajás	06°03' 04'' S	50°12' 24'' W	739
This report	Brazil	Pará	Serra dos Carajás	06°03' 06'' S	50°11' 49'' W	739
This report	Brazil	Pará	Serra dos Carajás	06°02' 55'' S	50°15' 35'' W	709

Appendix 2. External and cranial measurements (mm) and weight (g) of the two adult male (P 3/3 M 4/4) voucher specimens (MN73872, MN74002) and holotype specimen (USNM461348, National Museum of Natural History, Washington DC, USA). Measurements from holotype (adult male) as in Anderson (1982) and Sancha *et al.* (2007). Definitions of measurements are those of Voss *et al.* (2001).

MEASUREMENTS	MN 73872	MN 74003	USNM 461348
Head and Body Length	94	93	-
Tail Length	47	46	-
Hindfoot Length	13	12	-
Ear Length	12	12	-
Weight	21	17.2	-
Condylobasal Length	26.7	26.0	23.2
Molar Length (M1 to M4)	5.7	5.8	5.0
Molar Length (M1 to M3)	4.9	5.1	4.3
Palatal Breadth	7.3	7.6	7.0
Palatal Length	12.6	12.7	12.1
Least Interorbital Breadth	4.8	5.0	4.5
Zygomatic Breadth	13.8	13.7	12.0